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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/801,374	03/15/2004	Pooran Chandra Joshi	SLA0787	3177

55286 7590 11/09/2005

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EXAMINER	
LEE, HSIEN MING	

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 11/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/801,374	JOSHI ET AL.	
	Examiner	Art Unit	
	Hsien-ming Lee	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 September 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The replaced drawing(s) filed on 9/2/05 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

HSIEN-MING LEE
PRIMARY EXAMINER

11/8/05

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Remarks

1. The objection to claims 6, 20-22 and 102(e) rejection to claims 1, 20 and 21 under Wang et al. have been withdrawn in response to applicants' arguments and amendment filed 9/2/2005.

Grounds of Rejections

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-21, 23 and 24 are rejected under 35 U.S.C. 102(e) as being anticipated by Joshi et al. (US 6,689,646).

In re claims 1-3, 15, 20, 21 and 24, Joshi et al. teach the claimed method for fabricating thin film oxide, comprising:

- forming a substrate 308/304/302 including forming an amorphous silicon layer 308 (Fig.3);
- treating the substrate 308/304/302 at temperature less than 400 °C (col. 3, lines 56-61) using a high density plasma inductively coupled (ICP) source (col. 3, lines 59-60); and

- forming an M oxide layer 402 (i.e. a binary oxide, silicon oxide, Fig.4 and col. 3, lines 59-60) where M is an element selected from a element (i.e. Si) chemically defined as a solid at room temperature and having an oxidation state in a range of +4.

In re claims 4, 6, Joshi et al. teach using the inductively coupling plasma at a temperature of less than 400° C; in a range of 13.56 megahertz (MHz) with a power density up to 0.1~1.6 watts per square centimeter (W/cm2); at a pressure of up to 500 milliTorr (mTorr); with a mixture of inert gas and oxygen in a ratio of approximately 20:1 to 200:1 and with a total gas flow of approximately 50 to 200 sccm (col. 6, lines 55-67); and the mixture of the inert gas and oxygen includes mixing oxygen with inert gas selected from the group including helium, argon and krypton (col. 7, lines 1-3).

In re claim 7, Joshi et al. teach forming a silicon layer 304 (Fig.7).

In re claim 12, Joshi et al. teach using an ICP source including an HDPCVD to treat the substrate (col. 5, lines 61-62) and forming an M oxide layer 402 (i.e. silicon oxide) overlying the substrate including depositing the M oxide layer 506.

In re claims 5, 13-14 and 16, Joshi et al. teach using an ICP source in a range of 13.56 MHz with a power density 0.1~1.6 W/cm^2 at a pressure of 15 to 500 mTorr and a reactive gas (i.e. N_2O) and precursor compound (SiH_4) having M (i.e. Si) in a decomposable form the gases (N_2O) and precursor compounds in a ratio of 10:100 to 25:100 in accordance with the value state of M including inductively coupling plasma with a mixture of SiH_4, N_2O and N_2 gases in a ration of approximately 10:100:50 to 25:100:50 (col. 7, lines 59-63).

In re claims 8 and 17, Joshi et al. teach forming a transparent substrate layer 302 and forming a diffusion barrier 704 overlying the transparent substrate 302 underlying the silicon layer 304 (Fig.7), wherein forming the silicon layer 304 including forming transistor channel 706, source 708 and drain 710 in the silicon layer 304; wherein depositing a gate dielectric layer 402 and forming a gate electrode 712 overlying the gate dielectric layer 402.

In re claims 9 and 18, Joshi et al. teach forming a dielectric layer with a fixed oxide charge density of less than $5 \times 10^{11}/cm^2$; an interface trap concentration of approximately 0.9×10^{10} to $8 \times 10^{10}/cm^2$ eV; a flat band voltage shift of less than 1 V; a leakage current density lower than $10^{-7}A/cm^2$ at a applied electric filed of 8 MV/cm; and a breakdown field strength greater than 10 MV/cm (col. 5, lines 20-29).

In re claims 10 and 19, Joshi et al. teach forming a silicon oxide layer with a refractive index between approximately 1.45 and 1.47 (col. 4, lines 8-9).

In re claim 11, Joshi et al. teach forming a base layer 704 of a material; and depositing a thin film 402 of element M (Si) overlying the base layer 704 and wherein plasma oxidizing the substrate includes plasma oxidizing the thin film of M, i.e. oxidizing 308 layer of Si (Fig.3) to form plasma oxided layer 402 (Fig.4).

In re claim 23, Joshi et al. teach the claimed method for fabricating thin film oxide, comprising:

- forming a substrate 308/304/302 including forming a silicon layer 308 (Fig.3);
- treating the substrate 308/304/302 at temperature less than 400 °C (col. 3, lines 56-61) using a transmission/transformer coupled plasma source (col. 5, lines 1-3); and

- forming an M oxide layer 402 (i.e. a binary oxide, silicon oxide, Fig.4 and col. 3, lines 59-60) where M is an element selected from a element (i.e. Si) chemically defined as a solid at room temperature and having an oxidation state in a range of +4.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Joshi et al. in view of Han et al.(US 2002/0100554).

Joshi et al. teach that the high density plasma source is ICP but not selected from the group including ECR and cathode-coupled plasma.

However, Han et al. teach that high density plasma source can be any suitable high density source, such as ECR or ICP (paragraph [0041]).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time of the invention was made, to substitute ICP of Joshi et al with ECR, as taught by Han et al. for the purpose of forming the M oxide, since ECR is an art- recognized equivalence to ICP as the high density plasma source.

Response to Arguments

6. Applicant's arguments filed 9/2/2005 have been fully considered but they are not persuasive.

Applicants asserted that US 6,689,646, which was cited in the previous Office action in 102(e) rejection against claims 1-21, 23 and 24, was not filed by another because Joshi is a co-inventor of the current application and being a co-inventor of the '646 patent.

The examiner disagree with the foregoing argument because inventors in the '646 patent include Pooran Chandra Joshi, John W. Hartzell, Masahiro Adachi and Yoshi Ono, which are different from inventors of the current application, Pooran Chandra Joshi and Apostolos T. Voutsas. Therefore, the 102(e) rejection against claims 1-21, 23 and 24, as set forth in the previous office action, is deemed proper.

Regarding 103(a) rejection, applicants further argued that the '646 patent cannot be used as a 35 U.S.C. 103(a) reference because '646 patent has a same assignee as that of the current application.

In response to the argument, it is submitted that 103(c) issue raises if the reference **only** qualifies as prior art under 35 U.S.C. 102(e), (f) or (g). However, the '646 patent not only qualifies as 102(e) but also qualifies as 102(a) because the issue date of the patent is February 10, 2004, which is prior to the filling date of the current application, March 15, 2004. In addition, 103(c) issue does not apply to the situation where there is no same inventor.

For reasons above, 102(e) and 103(a) rejections, as set forth in the previous Office action, are deemed proper.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-ming Lee whose telephone number is 571-272-1863. The examiner can normally be reached on Tuesday-Thursday (7:30 ~ 6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hsien-ming Lee
Primary Examiner
Art Unit 2823

Nov. 8, 2005

HSIEN-MING LEE
PRIMARY EXAMINER

11/8/05

Fig. 1
(PRIOR ART)

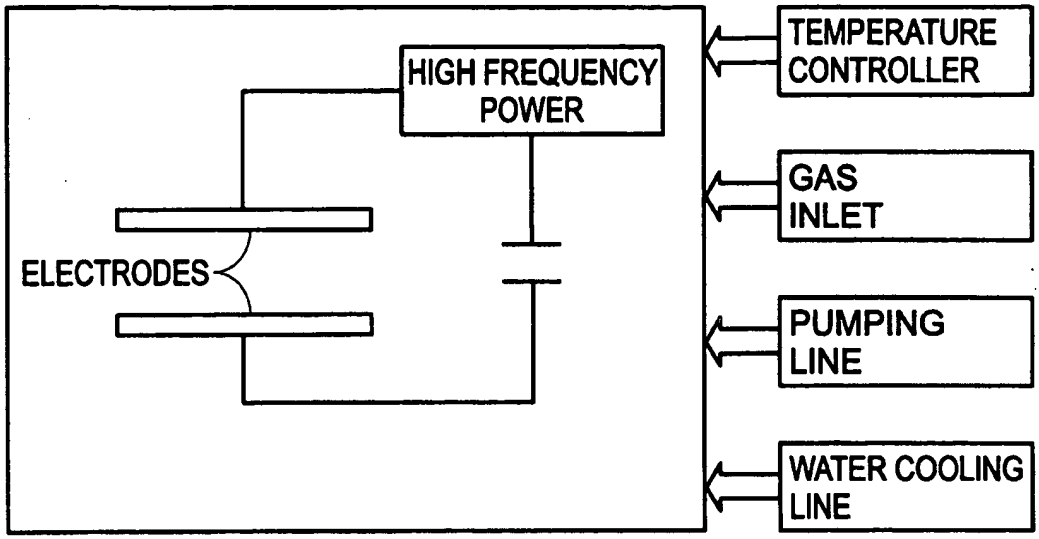

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Fig. 2

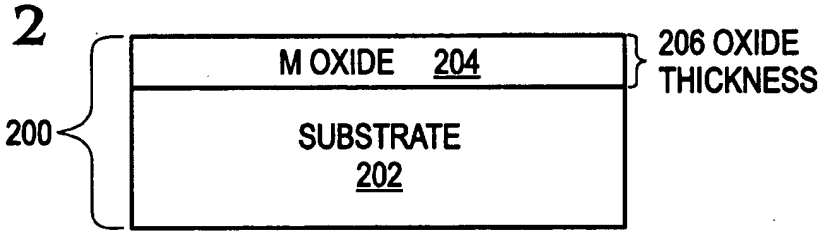

Fig. 3

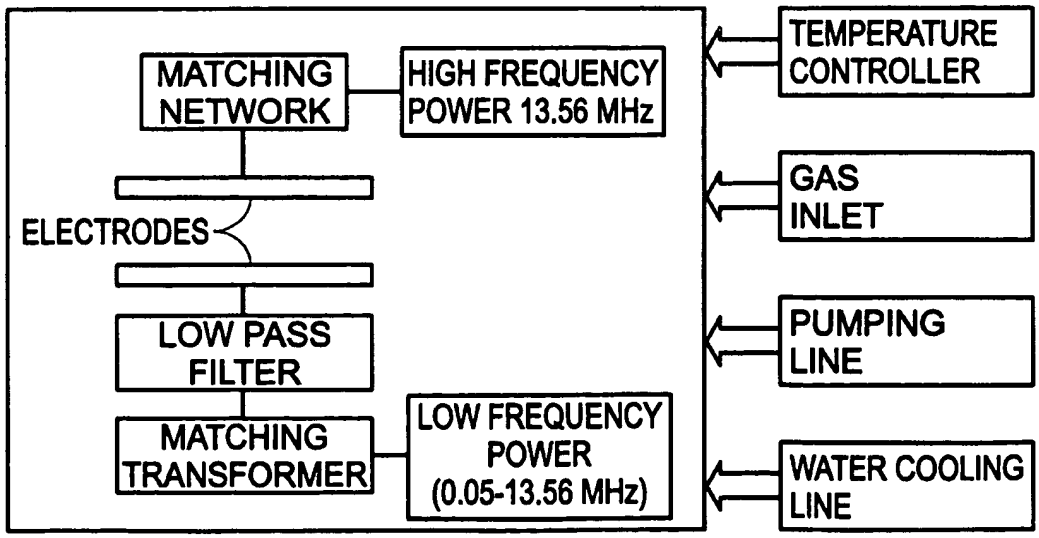

Fig. 4a

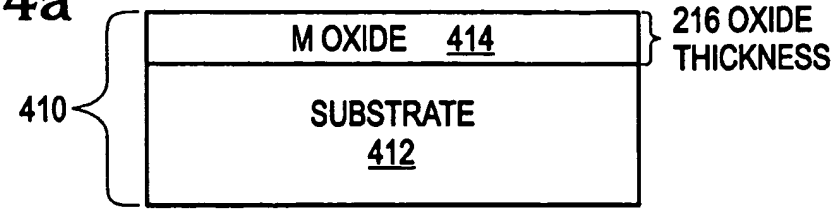

Fig. 4b

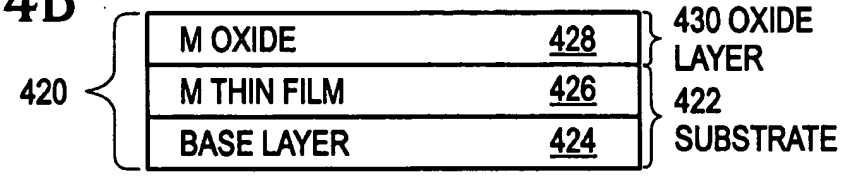

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Fig. 4c

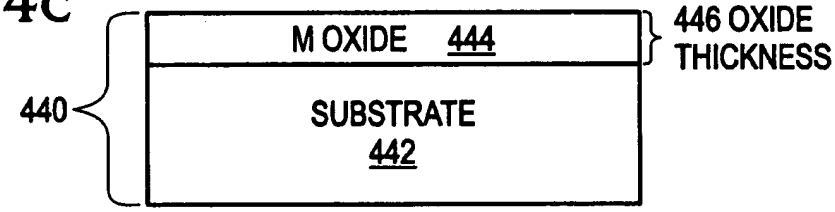

Fig. 6

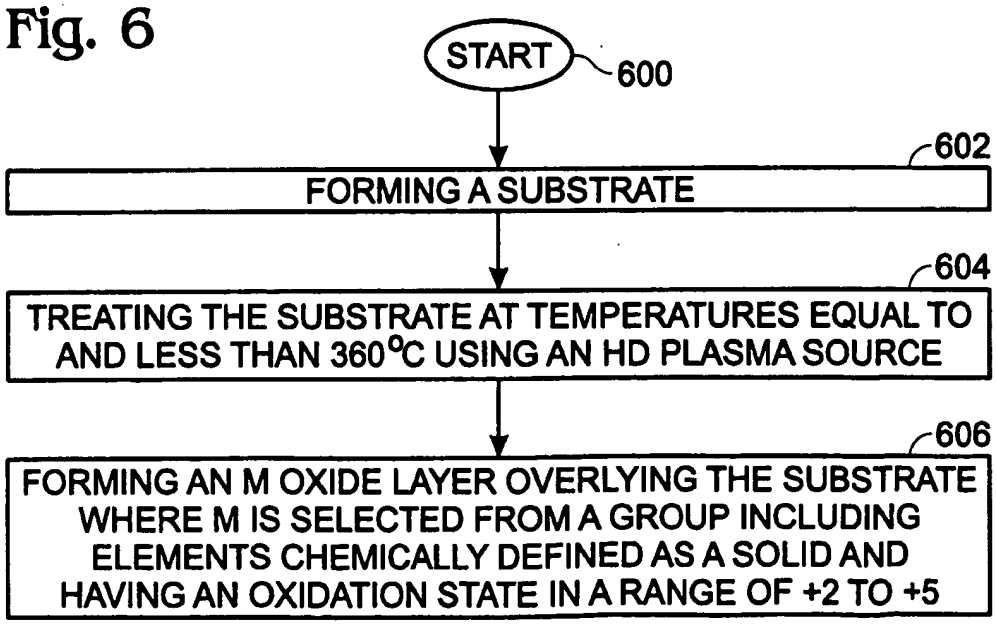

Fig. 5

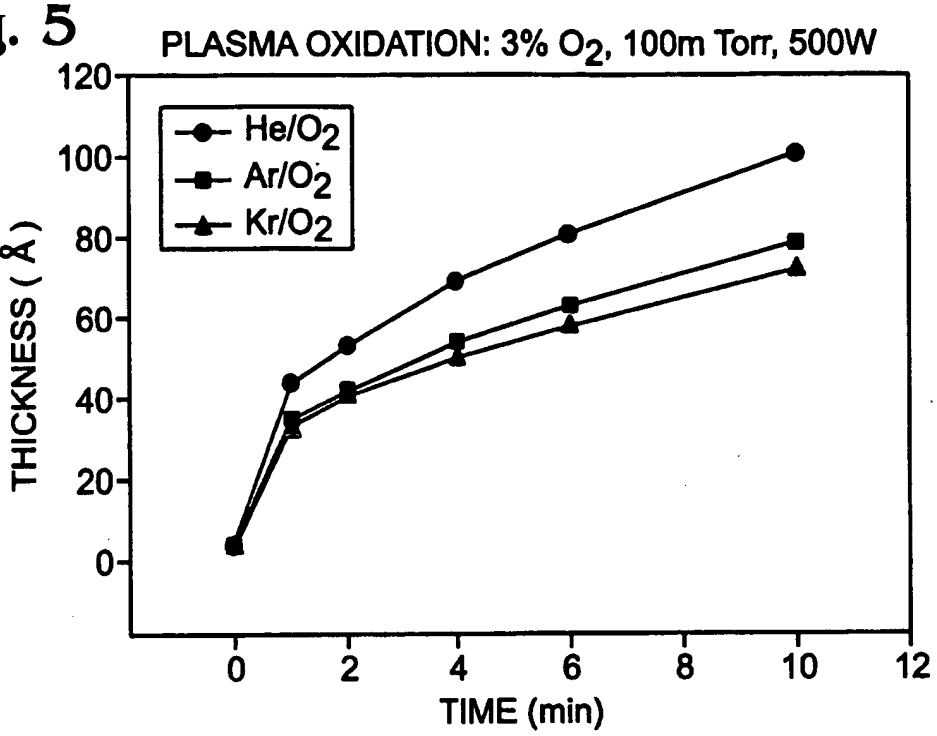

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Fig. 9

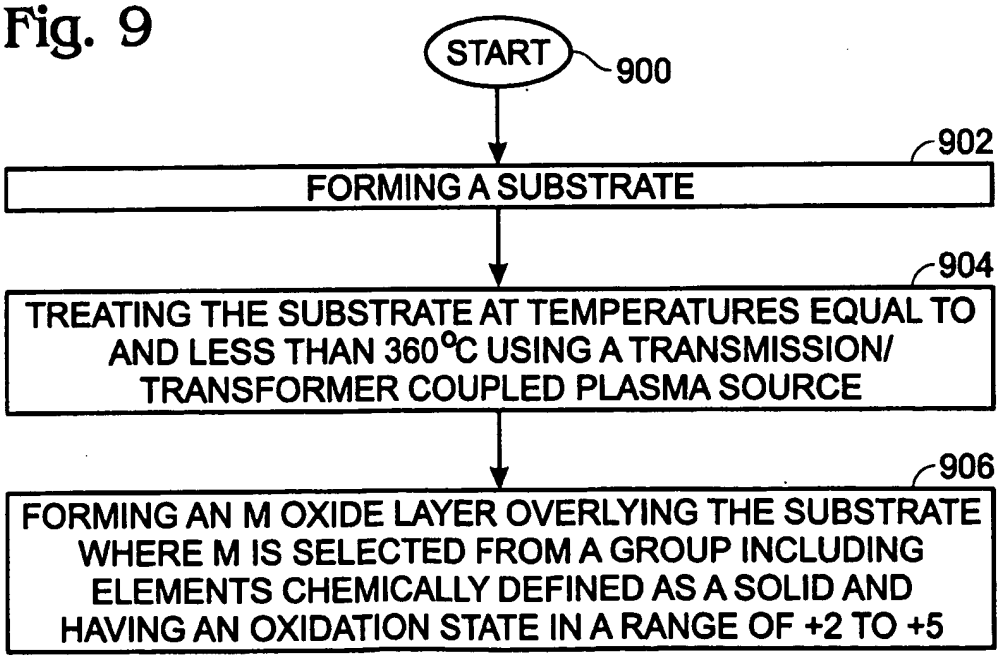

Fig. 7

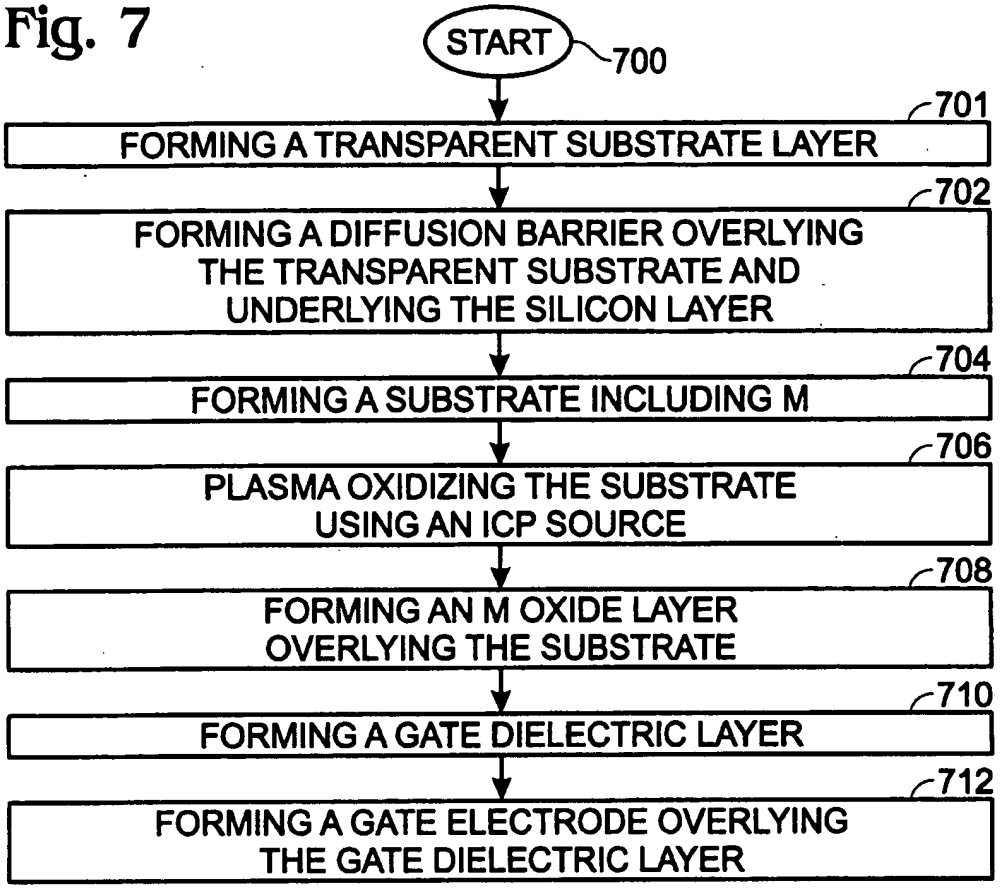

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Fig. 10

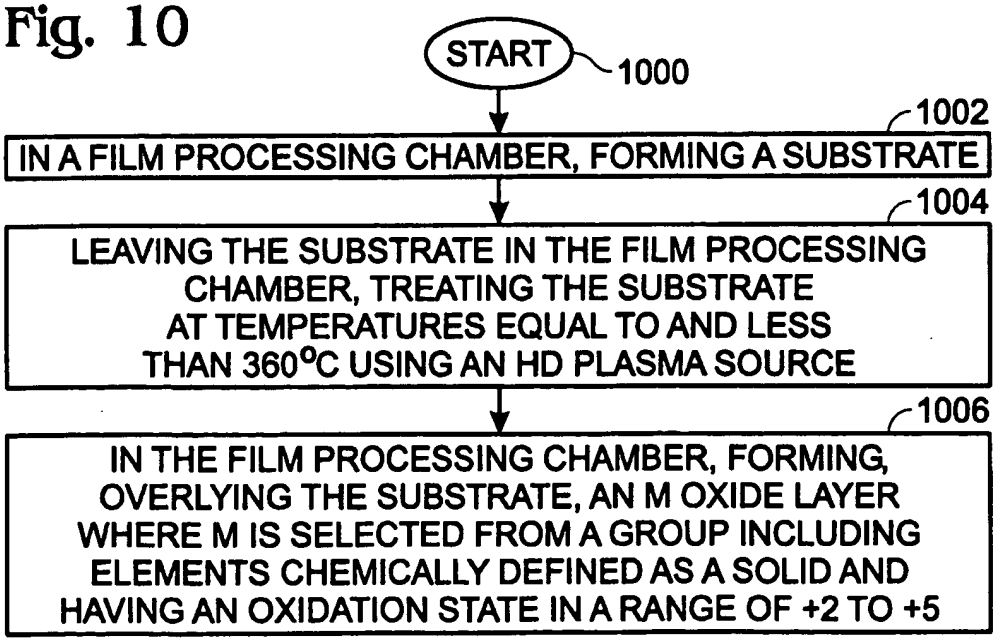
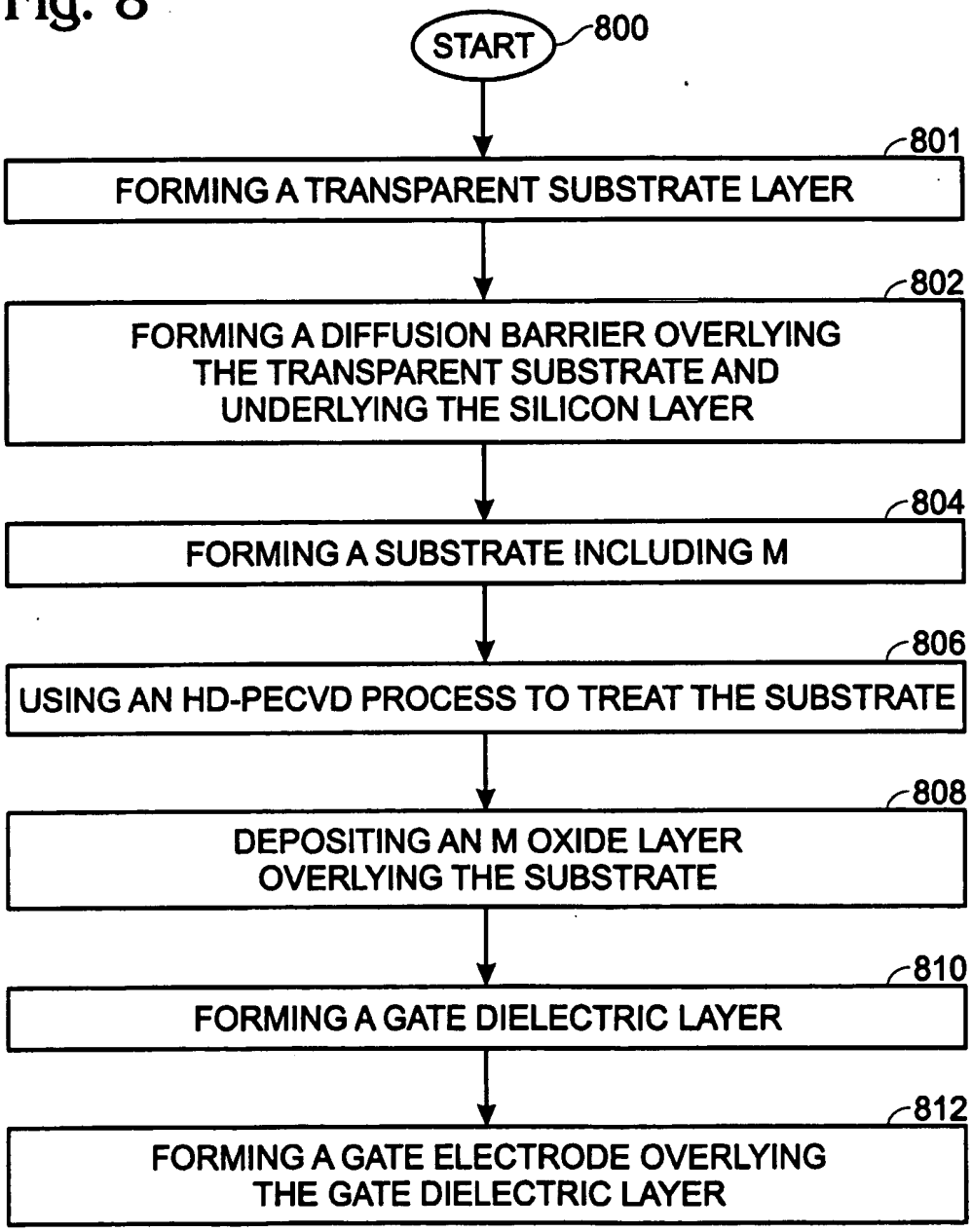


Fig. 8



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